In re Application of: Ziv REICH et al
Serial No.: 10/700,588
Filed: November 5, 2003
Office Action Mailing Date: September 13, 2007

Examiner: Timothy J. Dole
Group Art Unit: 2858
Attorney Docket: 26749

REMARKS

Reconsideration of the above-identified application in view of the amendments above and the remarks following is respectfully requested.

Claims 36-53 and 134-151 are in this Application. Claims 1-35, and 54-133 have been withdrawn from consideration. Claims 36-53 and 134-151 have been rejected.

No amendments to the claims are made in this response.

35 U.S.C. § 102 Rejections

The Examiner rejects claims 36-43, 49-53, 134-141 and 147-151 under 35 § U.S.C. 102(b) as being anticipated by Reich et al. The Examiner identifies in Reich et al. the capacitor, the fluid channel, the variable cross-sectional area and the electrical contacts. The Examiner refers to paragraph [0102] of Reich et al. and states that the variable cross-sectional area of Reich et al. is selected so that a change in a capacitance of the capacitor represents a location of the fluid in the fluid channel.

Applicant respectfully traverses the rejection and states that the Examiner has not established a prima facie case of anticipation regarding claim 1, since Reich et al. lacks at least one limitation of claims 1 and 134.

The following relates to the independent claims. The dependent claims are patentable at least by virtue of their dependency on their parent claims.

Reich et al. do not teach any monitoring of fluid locomotion. Rather, Reich et al. disclose a detector for determining presence, number, length concentration, position, acceleration and/or velocity of conductive particles in the fluid. Reich et al. specifically teach that the detected particles must be conductive. For example, in paragraph [0103] Reich et al. teach that the particles detected using the detector are linked to at least one conductive particle, so as to promote the variation in dielectric coefficient of the system. Reich et al., however, do not even hint that a change in the capacitance of the capacitor represents a location of the fluid in the fluid channel.

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Applicants submit that the claims of the present invention are not implicit to Reich et al. because the detection of conductive particles in the fluid is not the same as the monitoring of fluid locomotion. This is because (i) the particles can be in motion relative to the fluid hence their location or motion characteristics is not sufficient to monitor the fluid locomotion, and (ii) Reich's device cannot be used when the fluid is devoid of conductive particles.

Thus, claims 1 and 134 are not anticipated nor are they rendered obvious by Reich et al.

35 U.S.C. § 103 Rejections - Wang el al.

The Examiner rejects claims 44, 45, 142 and 143 under 35 U.S.C. § 103(a) as being unpatentable over Reich et al. in view of Wang et al.

The Examiner acknowledges that Reich et al. fail to disclose a device and method in which the fluid channel is an HPLC column and the capacitor comprises two conductive plates engaging opposite faces of the HPLC. In this respect, the Examiner refers to Figure 2B and column 15, lines 1-4 of Wang el al. stating that Wang's fluid channel is an HPLC column and the capacitor comprises two conductive plates engaging opposite faces of the HPLC column. The Examiner concludes that it would have been obvious to one skilled in the art at the time of the invention to incorporate the HPLC column of Wang el al. (it is believed that the Examiner reference to column 15 lines 1-6 of Jorgenson et al. is in error since this passage in Jorgenson et al. does not relate to HPLC) for the purpose of providing improved, highly-sensitive analysis of the fluid in the channel.

The Examiner rejection is respectfully traversed. Applicants submit that the Examiner has not established a prima facie case of obviousness since (i) Wang el al. do not provide what Reich et al. lack, and (ii) Wang el al. teach away from the claims.

Wang et al. disclose an inductive ionization device which can be interfaced with a mass spectrometer to provide for mass analysis of liquid samples. Wang's ion source operates according to the principle of direct inductive ionization, ionization

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resulting from electrochemistry occurring at or near the surface electrode, or ionization occurring by chemical and/or electrochemical processes away from the electrode (see column 7 lines 51-57). Wang et al., however, are silent with respect to the monitoring of fluid locomotion in the fluid channels, hence do not provide what Reich et al. lack.

Moreover, although Wang et al. teach the use of their device as an electrochemical detector for liquid chromatography, they specifically teach that a detector which is based on electrochemical process is superior to capacitance based detection. Thus, even the highly skilled artisan would not consider incorporating the HPLC column of Wang el al. in Reich's detector, since Reich's detector is a capacitance based detector and Wang el al. teach away from capacitance based detectors in HPLC columns.

It is therefore submitted that claims 44, 45, 142 and 143 are novel and non-obvious over Wang el al. and Reich et al.

35 U.S.C. § 103 Rejections - Jorgenson et al.

The Examiner rejects claims 46-48 and 144-146 under 35 U.S.C. § 103(a) as being unpatentable over Reich et al. in view of Jorgenson et al.

The Examiner acknowledges that Reich et al. fail to disclose a device and method in which the fluid channel is a microchannel of a microfluidic device selected from the group consisting of a drop ejector, a droplet microswitch, an extracellular electrode, a multi electrode array, a lab-on-chip device and a drug delivery microdevice. In this respect, the Examiner refers to Figure 3 and paragraphs [0072]-[0073] of Jorgenson et al. and identifies a fluid channel which is a microchannel of a microfluidic device, and a capacitor which comprises two conductive plates engaging opposite walls of the microchannel. The Examiner identifies in paragraph [0072] a drop ejector, a droplet microswitch, an extracellular electrode, a multi electrode array and a lab-on-chip device.

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The Examiner rejection is respectfully traversed. Applicants submit that the Examiner has not established a prima facie case of obviousness since there is lack of factual information for performing the combination.

Jorgenson et al. disclose a contactless resistive heating device which selectively heats small amounts of liquid inside of fused silica capillaries without making electrical contact with the liquid itself. The heating is via a combination of capacitive coupling of an AC current and resistive heating of the liquid.

It is noted that the capacitive coupling Jorgenson et al. does not include the use of a capacitor having two conductive plates engaging opposite walls of a microchannel. Jorgenson et al. specifically describe that the capacitive coupling is between the AC voltage and a conductive solution across the dielectric material which forms the capillary wall (see paragraph [0068]). Moreover, Jorgenson et al. teaches away from any capacitive coupling between the two electrodes 16A and 16B. As described in the end portion of paragraph [0068], Jorgenson et al. require a shield (reference numeral 18 in Figures 1A-C) between electrodes 16A and 16B to reduce their direct capacitive coupling to each other. Same teaching is reheated in other places of Jorgenson's disclosure, see, *e.g.*, paragraph [0087].

In paragraph [0072], to which the Examiner is referring in his rejection, Jorgenson et al. merely state that their heating device can be integrated in a lab-on-chip device, but do not provide the skilled person with sufficient information how to adjust the heating device to monitor fluid locomotion in a microchannel of a microfluidic device. No such information is provided in paragraph [0073] which further details the lab-on-chip heater.

It is submitted that the mere statement that a heating device can be integrated in a lab-on-chip device cannot render the claims obvious, since there is lack of factual information for combining the heating device of Jorgenson et al. with the detector of Reich et al. for the purpose of monitoring fluid locomotion in a microchannel of a microfluidic device. Furthermore, since Jorgenson et al., as stated, teaches away from any capacitive coupling between the plates, the ordinarily skilled person would not be

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motivated to combine the two references, because lack of capacitive coupling between the plates will make Reich's detector inoperative.

It is therefore the Applicants' strong opinion that claims 46-48 and 144-146 are not rendered obvious by Reich et al. and Jorgenson et al., either singly or in combination.

U.S. Patent Nos. 6,562,012, 4,105,028 and 3,545,271 cited in the office action, have been carefully reviewed but are deemed not to anticipate nor render obvious Applicant's claims, either singly or in combination.

In view of the above amendments and remarks it is respectfully submitted that claims 36-53 and 134-151 are in condition for allowance. A prompt notice of allowance is respectfully and earnestly solicited.

Respectfully submitted,

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Date: January 14, 2008

Encl.:
Petition for Extension (1 Month)